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## INTRODUCTION

This second issue of T. R. I. Bulletin approaches somewhat closer in departmentization and subject matter to the character that your officers and research committee have in mind for as long a period as the publication is restricted to mimeograph form.

The number of pages has been more than doubled, and the greatest increase is in the departments devoted to research abstracts, bibliography and book reviews.

More space than usual was necessarily devoted to meetings and news, because an important function of T. R. I. Bulletin is to keep members informed of the activities of officers, directors and committees, which activities since the initial issue were rendered of more than normal importance by the series of meetings in New York City, February 24.

The value of T. R I. Bulletin will be measured by the character of the service that it performs for members. Constructive suggestions or criticisms that may tend to improve its service in its present mimeographed form will be appreciated.

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## The New York Meetings, February 24, 1931.

### Larger Executive Committee Authorized--Board of Trustees Elected--Research Sub-Committees Appointed--Interesting Papers Read.

Approximately 25% of T. R. I. memberships were represented at the combined special meeting of the corporation and the first quarterly meeting of the Board of Directors, held at the Chemists' Club, New York City, the afternoon of Tuesday, February 24. The principal accomplishments were as follows: Amendment of Section 2 of Article II of the By-Laws authorizing the increase of executive committee membership from six to not more than twelve members; election of first Board of Trustees; election of P. H. Hanes, Jr., Winston-Salem, N. C. to succeed B. E. Geer, resigned; election of 15 new annual and 2 new contributing members; presentation of formal papers on technical and economic subjects.

During the morning there were sessions of the executive and research committees, the former being devoted largely to routine matters while the latter devoted much of its time to the discussion of needed sub-committees and the nature of their work and personnel. Following these meetings the President held an informal reception in the lobby, this and the luncheon served at 1 p.m. providing ample opportunity for social intercourse. In commenting on the meetings one of the directors writes as follows: "Everything went off nicely; the attendance was good and the interest was remarkable."

## Meeting of the Research Committee.

Chairman W. E. Emley presided at the meeting of the research committee, the other members present being Dr. Edwards, Prof. Haven and A. R. Pierce, also the President and Secretary. Full discussion of the agenda in writing had been received from Messrs. Olney, McGowan and Walen of the committee.

The discussion of bibliography and abstract service developed the opinion that none of the abstract services now available covers the entire textile field adequately, and that the Institute is justified in establishing a new abstract service even though the material may duplicate that which is to be found elsewhere. A sub-committee on abstract service was appointed consisting of Dr. W. F. Edwards, Chairman, Dr. W. E. Emley, Prof. Schwarz and E. D. Walen.

Chairmen of the sub-committees were elected as follows, they being authorized to select their own personnel: Mill Research, Prof. George B. Haven; Economic Research, H. V. R. Scheel; Testing Research, Prof. H. J. Ball. The selection of a chairman for the sub-committee on Scientific Research was left in the hands of Chairman Emley. Two new research problems were presented to the committee, one on the use of ammonia in place of sodium in textile processes, and the other on the development of fabrics for use as dust collectors, and it was voted to refer both of these problems to the appropriate sub-committees.

Following a discussion of the survey of textile research organizations and facilities it was decided that the committee should proceed to set up its own regional contact organizations in order that information of this character may be continuously kept up to date.

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## Executive Committee Meeting.

The regular monthly meeting of the executive committee was called to order by the President at 11 a.m., with E. N. Hood, Dr. E. H Killheffer, H. V. R. Scheel and the Secretary present. Only routine matters having to do with reports of the Secretary, Treasurer and committees were acted upon, but the committee prepared a ticket for the Board of Trustees to be submitted to the special meeting of the corporation that afternoon. The Treasurer's report, covering period from October 1, 1930 to February 1, 1931, showed a gross balance of $2401.58 and a balance of current funds of $401.58. A budget for the balance of the fiscal year was presented but definite action was deferred until the next meeting of the committee.

The question of date and place of meeting for the next quarterly meeting of the Board of Directors was placed on the table for future action. The next meeting of the executive committee was tentatively scheduled for the second Tuesday in April or subject to the call of the President. (This meeting was later called for March 24 as the President must leave for a European trip early in April).

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## Combined Meetings of Directors and Corporation.

It having been found that there was no business in the agenda for the meeting of the Board of Directors that could not be acted upon at the special meeting of the Corporation, it was decided to hold a combined meeting of both bodies and this was called to order by the President at 2:15 p.m.

The President briefly reviewed the work of officers and committees since the annual meeting, stating that they are "Trying to get the job crystallized, and are

gradually beginning to see light." "In this day of research," he added, "it is necessary to get the industry research-minded so that it may realize that research is a scientific way of working out its problems. But first it is necessary to see the problem clearly and to have the cooperation of all factors."

The Secretary's reports of the meetings Nov. 6, 1930, of the Corporation and of the Directors having been received by all members were adopted without reading. Report of the executive committee was presented by the Secretary and adopted. (Members desiring copy of this report may obtain it by addressing the Secretary.)

The report of the research committee was outlined extemporaneously by Chairman W. E. Emley and as thus presented was adopted. He stated that the committee has divided its work broadly into the following four fields: (1) Economic or scientific research, the foundation of it all; (2) research work in the mills, including design and operation of machines, design of fabrics and proper utilization of fibers; (3) economic research, including such problems as finding markets for finished goods, etc.; (4) research on the suitability of fabrics for use, testing methods, development of testing machines, devising service tests, etc. Various sub-committees of the research committee are being formed to handle specific branches of the industry and specific phases of their problems. By letter ballot the committee has selected four major problems from a group of 23 originally suggested, these major problems being as follows: (1) "Scientific Study of the Wear of Fabrics and the Development of Methods for Measuring Resistance to Wear; (2) Investigation of the Relative Suitabilities of the Present Methods for Testing Yarns; (3) Study of the Causes of Shrinkage of Cotton and Wool; (4) Development of Textile Methods for the Fastness of Dyes. He also reviewed briefly the research survey being conducted for The Textile Foundation, and stated that to be of permanent value this survey must be made a continuing study.

Amendment of Section 2 of Article II of the By-Laws. - After noting that, in accordance with Article X of the By-Laws, the proposed amendment had been legally presented to the Secretary and to the members of the Corporation, the President stated that it had been found necessary to increase the number of members of the executive committee from six to not more than twelve if that committee was to be assured a representative quorum at its monthly meetings. Section 2 of Article II as adopted unanimously now reads as follows: "Enumeration of Committees. There shall be two standing or permanent committees of the corporation; one designated as the "Executive Committee", which shall consist of not more than twelve members and the president ex officio; and the other designated as the "Board of Trustees" which shall consist of six members and the president ex officio."

Election of additional members of the executive committee as provided by the amendment was laid on the table at the suggestion of the President, he expressing the opinion that there should be a careful canvass of the Board of Directors prior to such election in order to secure a membership that can be depended upon to provide a working quorum at each meeting of the committee.

Election of Board of Trustees. - The following nominees for the board as suggested by the executive committee were elected unanimously: A. E. Colby, Treas., Pacific Mills, Boston, Mass.; Alex. Morrison, Sec., American Association of Textile Chemists and Colorists, Andover, Mass.; Albert R. Pierce, Agent, Pierce Mfg. Corp., New Bedford, Mass.; A. R. Mitchell, Jr.; Allen R. Mitchell & Son, Philadelphia, Pa.; P. J. Wood, Vice-Pres., Oriental Silk Printing Co., Haledon, N. J.; and Dr. E. H. Killheffer, Pres., Newport Chemical Works, Passaic, N. J.

Election of New Director. - The Secretary reporting that election of Mr. B. E. Geer as a contributing member had been due to a misunderstanding, and that, as he had never qualified as such, his election as a director was voided, the election of a director to fill the vacancy was in order and P. H. Hanes, Jr., Pres., P. H. Hanes Knitting Co., Winston-Salem, N. C. was elected by unanimous vote.

Election of New Members. - The following list of membership applications as reported by the Secretary were elected en block unanimously: Contributing; Hope Webbing Co., Pawtucket, R. I., represented by C. A. Horton, Pres. & Gen. Mgr.; Textile Research Council, Boston, Mass., represented by C. H. Clark, Sec. Annual: W. G. Abbott, Jr. Wilton, N. H.; Lilian C.W. Baker, Div. Home Economics, Kansas State Agric. College, Manhattan, Kansas; Charles F. Goldthwait, Senior Industrial Fellow, Mellon Inst. of Indus. Research, Pittsburgh, Pa.; Barnett D. Gordon, Vice-Pres., Mass. Knitting Mills, Jamaica Plain, Mass.; W. P. Hamrick, Gen. Supt., Hampton Div., Pacific Mills, Columbia, S. C.; Arthur E. Hirst, Supt., American Printing Co., Fall River, Mass.; C. J. Huber, Mgr. Research Dept., Cheney Bros., South Manchester, Conn.; Ralph I Lindsay, Washability Bureau, Lever Bros., Cambridge, Mass.; Melliand Textile Monthly, New York City, represented by Dr. Schwarz, Pres.; William R. Moorhouse, Natl. Aniline & Chemical Co., Inc., Boston, Mass.; J. Frank Morrissey, Supt., Interlaken Mills, West Warwick, R. I.; Jewett B. Newton, Asst. Treas., Androscoggin Mills, Augusta, Maine; William A. Pedler, Agent, Acadia Mills, Lawrence, Mass.; E.M. Shelton, Research Director, Cheney Bros., South Manchester, Conn.; Albert W. Thompson, Vice-Pres., Parks-Cramer Co., Boston, Mass.

Resolution of Sympathy. - On motion of Mr. Broadbent, which was duly seconded, it was voted that in the death of H. R. Fitzgerald, an original member, director and vice-president of the Institute, the corporation had lost an ardent supporter of scientific research and the textile industry one of its ablest leaders, and that the Secretary be instructed to transmit to Mrs. Fitzgerald and her family and to Mr. Fitzgerald's business associates a message of sympathy and the formal record of this vote.

Technical Papers. - There being no other business calling for action the President declared the business session closed. He then stated that it was his hope at all similar future meetings to have the program enriched by the presentation of reports of researches, or papers and addresses upon technical and economic subjects.

He was gratified to be able to introduce two speakers at this meeting; Vice-President H. V. R. Scheel, who would read a paper on "An Index Figure for Measuring Relative Effectiveness of Management from the Social Standpoint", and Prof. George B. Haven of M. I. T., who had volunteered at the last minute to take the place of Prof. Schwarz of M. I. T.,who was unable to be present.

The methods employed by Mr. Scheel in developing the index figure do not lend themselves to brief abstracting. A careful reading of the whole paper will be found desirable and interesting, and copies may be obtained by addressing the Secretary. Quite as interesting as the methods employed in developing this index figure is the fact that its application proves conclusively that industry is suffering from "competition gone mad, which has resulted in such selling prices to industry's production as to mean loss of money to investors and lack of work for workers." Mr. Scheel believes that if society can be made to understand the nature of the industrial problem it can be relied upon to take the necessary steps to solve it. An index figure that will measure the relative effectiveness of management from the social viewpoint should go a long way toward development of a better understanding of this problem.

Prof. Haven's address was devoted to a brief exposition of each of a large list of textile problems suitable for scientific research. Both speakers held the close attention of their audience and won hearty applause, after which the session was declared adjourned.

## The Textile Research Questionnaire.

The Textile Research Questionnaires, which are the basis of the survey that U. S. Institute is conducting for The Textile Foundation, have been mailed to all members of T. R. I. without regard to whether they or the firms, institutions and other bodies with which they are connected had received them previously. It is hoped that all members identified with concerns doing textile research will make certain that the questionnaires have been answered and returned. Also, that they will not fail to give T. R. I. the benefit of research suggestions based upon their experience.

Questionnaires are anathema to most busy men and will be resorted to as infrequently as possible by T. R. I., but the information sought by this survey has never been published and could be obtained promptly in no other manner. Evidently this is very generally appreciated, for within three weeks of the date of mailing the questionnaire to the initial list approximately 50% of the list had replied.

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List of Officers, Directors, Committees and Members, as of February 24, 1931, has been published in booklet form. The edition is limited and is being utilized primarily in membership work, but members who desire copies may obtain them by applying to the Secretary. For your use in membership work the supply is unlimited.

Engrossed Parchment Membership Certificates are being mailed to those who qualify to receive them as fast as they are delivered by the engrosser. In the aggregate they are an expensive investment for T. R. I., but one that will pay dividends if Original Members will display them conspicuously in their offices.

## Textile Research as Viewed by Modern Physicist.

Dr. Karl T. Compton, president of M I. T., was asked by Maurice Holland, director of the National Research Council, as to what a physicist equipped with the modern tools of physical research would probably do to set about investigating textiles. Mr. Holland quoted from Dr. Compton's reply in a recent address before the textile committee of the American Society for Testing Materials, noting that it was merely a statement to create interest and was suggestive, rather than an attempt to outline a specific research program. The letter follows:

"You have asked me what a physicist equipped with the modern tools of physical research would probably do to set about investigating textiles. He would certainly do in this field just what he has done in the field of properties of matter--namely, go gunning for the elementary units of which matter is composed and try to determine its properties; then attempt to interpret the properties of the matter in bulk in terms of the properties of its component elements. In applying this to textiles, he would certainly concentrate his attention, not upon the cloth or other textile products, but upon the thread of which the cloth is composed. He would then, I believe, examine the thread to find out of what type cellular structure it is composed. This would certainly lead him to an investigation of cellulose cells and the binding material which holds them together.

"His most powerful tool would probably be the X-ray and the electron, for by means of the X-ray he would investigate the manner in which the atoms are combined together in various geometrical arrangements to form the elementary cell, and by means of the electron he could investigate the properties of the surfaces of these cells. Such investigations have already led to strikingly successful results in the investigations of closely allied substances such as asbestos fibers, mica, etc., in which the arrangement of atoms in the elementary crystals or cells has given the interpretation of the physical properties of the materials.

"In the field of metallurgy, such investigations have led to astonishing results, such as the production of non-sag tungsten wire, stainless steel and many other marvels of modern metallurgy. The secret of success of such modes of investigation is that the X-ray or the electron, because of their small size or penetrating nature, can get in, look around and examine what is going on on the inside of structures which are entirely too small for investigation by ordinary methods.

"I think that if you and I could become electrons, could enter one of these textile fibers and bat around on a tour of investigation, we would find something which would be extremely useful, if we could only translate ourselves back into human beings and tell the world what we saw. The modern physicist with his new research tools, comes as close to this as it is physically possible to do."

## RESEARCH ABSTRACTS

Relative Classification Values of Silk - D. E. Douty.
The American Silk Journal - January 1931.

An outline of a program for the unification of raw silk classification submitted to the Raw Silk Classification Comm. of the Silk Association of America. The Japanese Plan and the proposed scheme are considered concurrently, with reference made to a report included in the Proc. of the 2nd International Technical Raw Silk Conference "The concensus of opinion seems to be", states the article, "that the Size Deviation is not of sufficient importance to be included in the Classification. It also appears that Seriplane Test A so nearly coincides with Test B that it can be eliminated. If these two types are omitted, and the Auxiliary Types' of the American Classification and the 'Second Division Type' of the Japanese are compiled into a table of specifications of minimum values to constitute a good delivery, both classifications will rest upon the same basis and it only remains to work out satisfactory relations between Evenness and Cleanness and to determine the numerical value to arrive at a common grading." A table is given showing clearly the way in which the values for Cleanness and Neatness in the American Classification, especially in the upper grades, are out of line with the Evenness and Low Average. From Grade C down the two classifications are in good agreement. Four charts and several tables are included in the article. - (S)

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Use of the Microscope in the Textile Industry - J. M. Preston.
Textile Manufacturer, Manchester, England. (Jan., Apr., May, July, Aug., Oct., Nov. 1930 and Jan. 1931)

A series of articles covering types of optical equipment and accessories suitable for textile work; methods for recording and measuring; techniques of staining; mounting fiber sections; study of surfaces and fabric structure; use of the ultramicroscope; fluorescent phenomena in textiles; use of the polarising microscope, etc. Mr. Preston has apparently conducted a considerable amount of research in the field of textiles and has presented in brief form with many excellent illustrations the results, not only of his experience, but also of a thorough study of the literature. The numerous references to sources are valuable and the articles form a good review of recent work. - (S)

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Investigations on Textile Fibers - W. Harrison.
Royal Society Proceedings - Volume 94.

The author reports in compact form the result of his investigations of strained conditions in fibers, as shown by the use of the polarising microscope. Cotton was found to offer greater resistance to deformation than did wool, and both fibers showed permanent deformation under certain conditions. Silk, ramie, and linen showed similar results, but of lesser degree than for wool. In the dry state, fibers indicate a kind of plasticity in which strains produced by externally applied loads are accompanied by corresponding internal stresses; both disappearing when the fibers are treated with cold water. Heat up to 100°C. does not alter the nature of dry fibers in regard to this plasticity. The elastic limit appears to be higher for wool than for other fibers.

At high temperatures water renders the fibers truly plastic. Externally applied stresses produce deformation but little or no internal stress. The work is a striking example of the possibilities afforded by the polarising microscope for qualitative study of the basic properties of textile fibers. Quantitative work as an introduction to and as a study parallel with X-ray analysis will follow with improved apparatus and technique. - (S)

The Refraction of Light in Fine Filament Rayon. - Herzog.
Kunstseide, January, 1931.

The author reports results of a number of experiments concerned with the indices of refraction for rayons. The use of the polarising microscope for this purpose is described and the difference between the maximum and minimum index as well as the values for each is tabulated for each type of rayon. It is pointed out that the values are different for fine filament and coarse filament strands of the same brand. The former are more strongly double refracting. The largest variation in specific refractive index between fine and coarse filaments amounts to 52.4% for cuprammonium and the lowest is 27.3% for nitrate. The average index does not differ very appreciably between fine and coarse filaments. The principle indices of fine filament rayon, which lies in the fiber length parellel with and at right angles to the plane of polarisation, are smaller in the parallel position and larger in the perpendicular position than is the case with similarly oriented coarse fibered rayons. There would therefore, seem to be a difference in structure in the two types. - (S)

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The Foundations of Cotton Yarn Strength - A. J. Turner.
Textile Manufacturer - December 1928

The original material is to be found in Bull. No. 12 of the Central Indian Cotton Comm. It is stated that the pioneers Monae and Bowman were mistaken in their conclusion, as has also been pointed out by Dr. Balls. Recent work of Miss Clegg was referred to in regard to fiber breakage and her results are confirmed on 12 standard Indian cottons and 2 American cottons. The results show that about 50% of the fiber strength is realised in the single end and about 37% in the skein test. This fact will affect the relations in fabric strength. The yarn strength is discussed in detail. It is emphasized that complete expressions for yarn strength must recognize three facts: First, difference in strength with different variaties of cotton; second, differences of twist when comparing yarns, and third, the sizing or treatment of the surface. Detailed reference is made to the transmission of tension throughout the length of a yarn. Summarizing:- The fibers in a yarn are tested in groups and lie spirally in the yarn. The torsional forces resulting from twist may weaken the fiber under tension. Near their ends the fibers do not bear a load equal to their strength. Only a part of a fiber is tested in a fiber strength test. Imperfect structure results from variation of counts, imperfect sizing of fiber, variation in twist, and imperfect lie of the fibers. There is also inequality of stress distribution between the axial and surface fibers. Further study is necessary to get full quantitative results. - (S)

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A Recording Photoelectric Color Analyser - A. C. Hardy
Jol. of the Optical Society of America and Review of Scientific Instruments - Vol 18, No. 2, Feb. 1929.

A detailed description of a machine for accurately analysing the color of reflecting surfaces such as textiles. The instrument is automatic and is independent of the human element in matching of colors. The device plots a spectrophotometric curve for the sample and may be arranged to give the relative values of the three primary color sensations as well. The results are reproducible with precision of high order, and are independent of the color sensitivity of the photoelectric cell, and also of the color or type of light source No filters are employed, and the comparison of the color studied is made with standard white such as would be obtained from a magnesium carbonate surface.

(Abstractor's note - The commercial form of this instrument has been developed by the General Electric Co., and is now in use on textile problems.) - (S)

Fluorescence of Textile Dyeings in Ultra-Violet Light. L.Kummerer. Melliand's Textilberichte 1929, No. 10. The illumination of textile dyeings by ultra violet light supplies by the excitation of fluorescence a distinguishing characteristic fo. the recognition of textile dyeings. It has the disadvantage that it is based upon a subjective observation and is therefore ambiguously described. Also, its sphere of application is mainly confined to yellow, red, and violet dyeings. A brief report is given of the observations made during the examination of textile dyeings under ultra-violet light. The fluorescence of dyeings on wool, silk, and rayon is, in general, more brilliant than that of dyeings on cotton. Tables are given of examples of the most brilliant fluorescent dyeings of wool, silk, rayon and cotton. Dyestuffs derived from fluorescine show a particularly powerful fluorescence: mordant dyes and dyestuffs which have been after-treated with metallic salts or formaldehyde have almost without exception a dark, velvety appearance. - (S)

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"The Chemical Properties of Some Commercial Rayon Yarns", By B. P. Ridge, H. L. Parsons and Mary Corner. British Cotton Industry Research Association. Journal of Textile Institute, 1931, No. 2, T117. This is one of a series of studies on chemical analysis of rayons, conducted at Shirley Institute of the British Cotton Industry Research Association. The following results are discussed: (1) The Extent of Chemical Modification of the Cellulose: copper number, collected results of all experiments, loss of weight on boiling with alkali, methylene blue absorption, fluidity in cuprammonium hydroxide solution, acetic acid content of acetate rayons. (2) The Non-Cellulosic Impurities: ash content and ash alkalinity, extractable matter, sulphur content, copper content, iron content. Methods of Measurement: fluidity, acetic acid content, sulphur content. The effect of mercerization on the chemical properties of cotton is also discussed.

While the literature covering the chemical and physical properties of rayons is quite complete, that regarding their chemical characteristics is meager. Possibly this lack of chemical data is due to a belief that the rapid improvements in manufacturing technique might render any detailed records of results out of date almost before they were published. It is considered that the majority of rayon products are now sufficiently stabilized to make the accumulation and publication of research data worthwhile.

The present work was undertaken in order to ascertain the composition and amount of the non-cellulosic constituents of commercial rayons, and the extent to which the cellulose itself is chemically modified by the processes involved in the manufacture of the yarns, in the hope that the results would illuminate some effects of the technical operations concerned in the bleaching, dyeing, printing, and finishing of cotton-rayon and all-rayon fabrics.

Certain practical applications of results of these studies are noted. For instance, it is stated that in textile processing rayon yarns behave chemically like over-bleached or acid-attacked cotton. This is illustrated by the loss of weight on boiling with alkali. Previous studies have shown that oxycelluloses of copper number about 1, prepared from scoured cotton by the action of different oxidizing agents, all lose 6-8% in weight as a result of treatment with boiling 1% sodium hydroxide solution for four hours, and it is now shown that normal viscose rayons, which have about the same copper number, experience the same loss under identical conditions. "The amount of this loss is virtually the same as that found when grey, unbleached cottons are scoured under technical conditions, so that a grey cloth woven from cotton and a normal viscose yarn would lose roughly the same percentage of weight from both components in, say, an open or pressure boil, though a viscose rayon of higher copper number would lose more weight in this process. Coupled with the fact that it is difficult to obtain a good white in cotton without giving the material an efficient pressure boil, this suggests that in dealing with certain

classes of mixed cotton-rayon fabrics, such as, for example, handkerchief cloths, in which loss of weight of the rayon would be accompanied by loss of strength, cover and possibly lustre, it would be well to consider whether greater economy would not be effected in the long run by the use of scoured or bleached, instead of grey cotton warps, when a mild washing treatment, followed if necessary by a very light chemick, would give a good white in both component yarns without detracting from the strength or handle of the fabric."

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"Purified Textile Insulation for Telephone Central Office Wiring", by H.H. Glenn and E.B. Wood, Bell Telephone Laboratories. Reprint, B-390, May, 1929. This paper outlines methods by which silk and cotton insulation can be purified and improved. It gives the results of tests on the insulation properties of these materials before and after purification and explains the testing procedures.

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In a contemporary paper, "The Predominating Influence of Moisture and Electrolytes upon Textiles as Insulators", (1), Messrs. Williams and Murphy have shown that the electrical properties of textiles are closely associated with the moisture content and impurities in the textiles. In particular, water-soluble salts become ionically conducting in the presence of moisture and the ions migrate along the paths of initially low resistance to the electrodes with which they react chemically, causing serious corrosion. The resulting corrosion products, themselves, electrolytes, accelerate the process of current transfer and may easily lead to a complete failure of the insulating textile at the point of greatest concentration. Conversely if the impurities are removed, the insulating properties of the textile are improved initially and, furthermore, are not subject to cumulative deterioration due to concentration of conducting salts and electrolytic corrosion products at the weaker points. It is the purpose of this paper to show how these principles are borne out by field observations and laboratory tests, and to show in a general way the extent to which the insulating properties of silk and cotton can be improved commercially with particular application to telephone central office wiring.

## Conclusions

The discussion has been confined primarily to telephone central office cabling where silk and cotton are used in the cable core without impregnation. However, it is believed that the whole subject of purification of textiles becomes of general interest when it is stated that the improvements obtained by washing are not nullified by the supplementary use of impregnating waxes or varnishes. That is, the improvement in dielectric properties and reduced electrolysis obtained by washing and by impregnating are apparently substantially additive. While the studies have not proceeded far enough to cover comprehensively all of the better known impregnating waxes, asphalts, varnishes, etc., they have proceeded to the point where we can say that this is the case for the beeswax-paraffine waxes and certain asphaltic compounds. These findings are in line with the generally known fact that impregnation of textiles with wax compounds does not prevent, though it does retard, the absorption of moisture which in the presence of soluble salts causes conducting paths to be established, probably through the embedded textile fibers. Consequently, such materials as fabric base insulating tapes, varnished linens and cambrics, electromagnet coil winding insulation, all being sensitive electrically to moisture, should be benefited to a substantial degree by purification of the fibrous components.

Therefore, while there is still much to be learned about the behavior of silk and cotton with respect to their electrical characteristics under various treatments and conditions, the study has progressed to the point where the following statements can be made:

1. The removal of water soluble salts which are present in both silk and cotton not only results in a very decided improvement in their insulating properties, but reduces the sensitivity to change of the a.c. characteristics with changes in atmospheric moisture conditions.

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2. The improvement which can be realized is great enough to permit the substitution of washed cotton for silk where ordinary commercial silk has been found to give satisfactory results.

3. The use of purified textiles in cables carrying continuous d.c. potential will reduce electrolysis and consequently prolong the useful life of such cables about in proportion to the extent to which the purification process is carried.

(1) Presented at the Winter Convention of the A.I.E.E., New York, N.Y. Jan. 28-Feb. 1,1919; Abridgment published in A.I.E.E.Journal, February, 1929, p. 146.

## BOOK REVIEWS

"Mikroskopische u. machanisch-technische Textiluntersuchungen." ("Microscopic and Mechano-technical Textile Research") - Heermann and Herzog 451 pp., 314 figures 3rd. ed., 1931 Julius Springer, Berlin. (Obtainable from G. E. Stechert & Co. N.Y. City.)

A volume covering a review of the microscopy of the usual textile fibers. Of broader scope, but similar to Dr. Herzog's previous shorter books on silk and rayon, and flax and hemp. The photomicrographs are very fine and well reproduced, and several modifications of technique are described in detail.

The second half of the book deals with the physical analysis of textiles and covers such items as relative humidity measurements, a study of applications of the "Lunometer", variation of strength and elongation with moisture regain, determination of staple length and fiber diameters, yarn twist, counts, diameter, etc., fabric weave, porosity, gas tightness, waterproofness, and so forth. The material is confined entirely to German practice, but gives a modern review of textile technology as developed in that country. An abundance of tabular and graphical material is included, together with an excellent subject index. - (S)

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"Elementary Textile Microscopy" - Skinkle. Howes Publishing Co., New York City 1930.

A consolidation in book form of a series of articles by Mr. Skinkle which have appeared recently in The American Dyestuff Reporter. The volume of 144 pages is a brief account of the field of the microscope in textiles and an introduction to its use. The photomicrographs are rather poorly reproduced, and numerous of the illustrations are inferior. A serious error should be noted on page 7 in the discussion of the micro-determination of twist. Here the formula and the sketch from which it was developed are incorrect. On the whole, however, the seeker for elementary information will find some interesting material. - (S)

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"Preparation and Weaving of Artificial Silk or Rayon." - T. Woodhouse. Isaac Pitman and Sons, Ltd. New York City. 231 pp., 1930.

As reviewed by the Journal of the Textile Institute, the book deals for the most part with the preparation of the yarn and to a lesser extent with the actual technique of weaving. The illustrations are stated to be good photographs, photomicrographs, and line cuts. It is considered as satisfactory in that it gives a general idea of the machines and practices involved in the preparation of rayon yarns for weaving, and does so at a reasonable price. - (S)

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## BIBLIOGRAPHY

"Preparation of Air of Known Humidity and Its Application to the Calibration of an Absolute-Humidity Recorder". - A. C. Walker and E. J. Ernst, Jr.; Industrial and Engineering Chemistry (Analytical Edition) April 15, 1930.

A description of an apparatus capable of controlling moisture content within a variation of .001 per cent by volume, over long periods has been used to calibrate a sensitive humidity recorder having a sensitivity of .0016 per cent.

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"Cinematographic Apparatus for Special Purposes" ("Filmaufnahmegrate für Sonderzwecke. F. Isermann; Zeitschrift Verein deutscher Ingenieure, September 27, 1930.

Several new devices are described for slow speed motion pictures for such purposes as the study of the behavior of rope. One permits 5,000 exposures per second, and several other interesting cameras for continuous photography from different sides are mentioned.

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"Ultra-Violet Radiation-Recent Developments of Window Materials and Fabrics for Transmitting". - W. W. Coblentz; Transactions of the Illuminating Engineering Society Volume 25, April 1930.

Data on the transmition of fabric for ultra-violet radiation are given.

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"A High Sensitivity Absolute Humidity Recorder". - Crandall Z. Rosecrans; Industrial and Engineering Chemistry. (Analytical Edition) April 15, 1930.

An apparatus based on the measurement of the thermal conductivity of water, vapor and air mixtures which is continuous reading and records humidity from zero to saturation in a temperature range from 100° to 200° is described.

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"Notes on Stereoscopes". - C. Mazuir; Revue d'Optique, March 1930.

Discussions of the fundamentals of stereoscopy and the measurements from stereopic pictures, together with their inaccuracies and the causes of the latter.

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"The Tackiscope". - Robert Donner; Instruments, February 1931.

A brief description of a device to allow, among other things, examination of high speed parts while in motion, vibration, balance, etc. The instrument is conveniently portable and may be used for projection. It has no connection with the apparatus under examination.

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"Balances, Scales and Weights" (Chapter I-Hand Book of Laboratory Instruments and Apparatus) - A. Schroder; Instruments, January and February 1931.

A description of the various type of balances available, indicating their advantages and disadvantages and the special forms of interest to the production man.

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"Simplified Hand Stereoscope". - L. A. Hadley; American Journal of Roentgenology, Volume 23, February 1930.

A description of an instrument using separately adjustable prisms of the total reflection type.

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"Method of Determining the Effect of Light upon Wool". - W. Von Bergen; The Melliand April - May 1930.

The use of the microscope to show the effects of light and chemical reagents on wool fibres.

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"Treatment of Aluminum-Chloride Carbonized Wool before Dyeing." By Charles E. Mullin Textile World, Vo. LXXIX, No. 9, Pg. 28. The effects of aluminum-chloride carbonizing of wool and wool stocks are described, as are tests for the presence of chloride in carbonized stocks. Difficulties experienced in dyeing aluminum-chloride carbonized stocks are explained, and the ammonia rinse is suggested as a preventative of uneven dyeing and other troubles.

"Analysis of Sulphonated Oils". By Albert H. Grimshaw Textile World, Vol. LXXIX, No. 11, Pg. 36. Because the volumetric, gravimetric and extraction methods for the analysis of sulphonated oils yield highly discordant results as commonly used, the author has studied other methods in the hope of discovering procedure that might be accepted as standard. He outlines the methods of R. Hart, that were originally published in The Journal of Industrial and Engineering Chemistry, Sept., 1917, and that with later improvements were adopted as standard by the American Leather Chemists Association. A partial bibliography of the subject is appended.

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"The Generating and Application of X-Rays for Textile Investigations", by Herman Boxser, American Dyestuff Reporter, Vol. xx, No. 5. The properties of X-rays, X-ray apparatus and methods for producing diffraction patterns are described with acknowledgment to the following bibliography: Clark's "Applied X-Rays", McGraw-Hill Co. 1927; Kaye's "X-Rays", Longmans Green Co. 1914; "Present Status and Future Possibilities of X-Ray Research on Textiles," Clark, American Dyestuff Reporter 19, 1, 1930; "Cellulose as it is Completely Revealed by X-Rays," Clark, Ind. and Eng. Chem. 22, 5, 1930; "Cellulose in the Light of X-Rays," Bragg, Cellulose 1, 3, 1931; "X-Ray Examination of Gelatine Micelles," Abitz, Gerngross and Herrman, Abstract Chemical Abstracts 24, 22, 1930; "X-Ray Methods for the Structure of Cellulose, "Sponsler, Ind. and Eng. Chem. 20,1060, 1928; "Structure of Mercerized Cellulose," Sponsler and Dere, Jour. Amer. Chem. Soc. 50, 1940, 1928.

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